
	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

TABLE OF CONTENTS

1.0	OBJECTIVE	2
2.0	SCOPE.....	2
3.0	SAFETY & ENVIRONMENTAL.....	2
4.0	STOP START PROCEDURE OVERVIEW	2
4.1	Start-up and Loading (Ajax Only)	2
4.2	Shutdown Procedure (Non-Ajax).....	6
4.3	Isolation	6
4.4	Unit Start.....	8
4.5	Idle and Warm-Up.....	9
4.6	Start and Load (Without Bypass Valve).....	9
4.7	On-Line	11
4.8	Start and Load (With Bypass Valve)	11
4.9	Load	12
4.10	On-Line	13
	APPENDIX I: BACK MATTER AND RELATED CONTENT	14
A	VERSION INDEX	14
B	DEFINITIONS.....	14
C	OWNERSHIP STATEMENT	15
D	REFERENCES.....	15
E	RESPONSIBILITIES.....	16
F	DOCUMENT CLASSIFICATION.....	16
	APPENDIX II: PRINTING INSTRUCTIONS FOR STOP-START QUICK REFERENCE GUIDES.....	17
	APPENDIX III: STOP START QUICK REFERENCE: AJAX WITH AIR-TO-HEAD OR GAS-TO-HEAD STARTER	20
	APPENDIX IV: STOP START QUICK REFERENCE (AJAX WITH RING GEAR STARTER).....	22
	APPENDIX V: STOP START QUICK REFERENCE (WITH BYPASS LINE)	23
	APPENDIX VI: STOP START QUICK REFERENCE (WITHOUT BYPASS LINE)	25

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

1.0 OBJECTIVE

To standardize the Stop-Start procedure to reflect how the unit start-up and shutdown workflow should proceed under normal Operations Services business operations.

2.0 SCOPE

Establish a Stop-Start procedure to meet all governmental and Archrock requirements for all compressor packages in Operations Services.

3.0 SAFETY & ENVIRONMENTAL

Archrock Health, Safety, and Environmental (HSE) Standards that are applicable to the specific site/location. PRINT-READY VERSION SUITABLE FOR USE AS HAND-OUTS TO FIELD SERVICE TECHNICIANS, CUSTOMERS, OR FOR LAMINATION AND PLACEMENT IN THE EQUIPMENT PANEL.

4.0 STOP START PROCEDURE OVERVIEW

NOTE: IF YOU HAVE AN AJAX COMPRESSOR, GO DIRECTLY TO SECTION 4.1 FOR DETAILED, AJAX-SPECIFIC STOP-START INFORMATION. AJAX-SPECIFIC STOP-START INFORMATION IN APPENDIX III (AIR-TO-HEAD OR GAS-TO-HEAD STARTING SYSTEM) OR APPENDIX IV (RING-GEAR STARTING SYSTEM) IS ALSO AVAILABLE FOR USE.

NOTE: UNIT STOP-START QUICK REFERENCE GUIDES FOR AJAX WITH AIR-TO-HEAD OR GAS-TO-HEAD STARTING SYSTEMS (APPENDIX III), AJAX WITH RING-GEAR STARTING SYSTEM (APPENDIX IV), WITH A BYPASS LINE (APPENDIX V), OR WITHOUT BYPASS LINE (APPENDIX VI) ARE LOCATED AT THE END OF THIS DOCUMENT. THESE PRINT-READY VERSIONS ARE SUITABLE FOR USE AS HAND-OUTS TO FIELD SERVICE TECHNICIANS, CUSTOMERS, OR FOR LAMINATION AND PLACEMENT IN THE EQUIPMENT PANEL.


NOTE: FAILURE TO FOLLOW THIS PROCEDURE MAY RESULT IN FIRE, EXPLOSIONS, OR LIFE THREATENING CIRCUMSTANCES. IN CERTAIN INSTANCES, VARIANCE FROM THE FOLLOWING PROCEDURE MAY BE REQUIRED; IF SO, THESE VARIANCES MUST BE PRE-APPROVED BY MANAGEMENT.

NOTE: IF YOU ARE NOT PROPERLY TRAINED ON THE START-UP AND/OR OPERATION OF THE EQUIPMENT, DO NOT ATTEMPT TO OPERATE OR ISOLATE – CONTACT AUTHORIZED ARCHROCK PERSONNEL.

4.1 Start-up and Loading (Ajax Only)

4.1.1 Preparing Unit for Start-Up

1. Visually inspect the compressor and check the control panel to determine what caused the unit to shutdown. If the visual inspection of the control panel indicates a mechanical problem with the unit, do not attempt to start unit until mechanical problem is identified and repairs are completed.
2. Ensure suction (inlet) block valve to the compressor is in the closed position.
3. Ensure the blowdown valve is in the open position venting the compressor to atmosphere. Leave the blowdown valve open. Immediately check panel gauges to make certain all read “zero” to ensure no pressure is trapped in the compressor.
4. Open manual fuel valve.

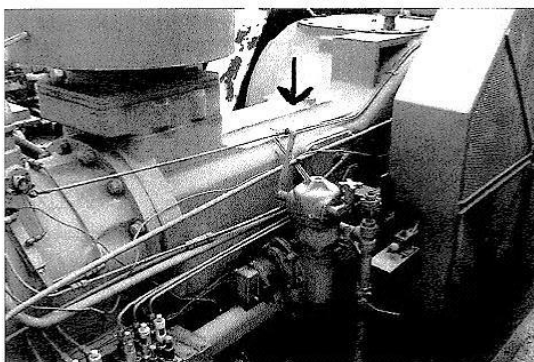
	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

5. Check the manual re-sets on the over speed and vibration kill switches to make sure they are not in the tripped position, reset if necessary.
6. Check water and oil levels.

4.1.2 Units with a Ring-Gear Starter


1. Open the valve in the starting motor supply line to admit pressure to crank the starting motor.
2. As soon as the fly-wheel reaches a cranking speed of 50 RPM, open the fuel gas valve to admit fuel into the system.
3. As soon as power cylinders begin to fire, close the valve in the Starting Motor supply line.
4. Let the engine and compressor warm-up to operating temperature at idle speed 300 RPM before putting the compressor on-line (loading).
 - Engine should be at least 140°F.
 - Compressor should be at least 80°F measured at the cross-head guide (cooler ambient temperatures may affect this temp).
 - It may be necessary to reset the control panel lock-out timer while waiting for the unit to warm-up. Make certain all pressure gages have a zero value (See Figure 4.1.2-1).

Figure 4.1.2-1: Temperature Rise Detection Point



Arrow points to power cross head guide on AJAX slow speed unit where operator can detect a temperature rise indicating unit is "warm".

5. After the engine and compressor have reached operating temperature open the manual fuel valve to the full-open position and adjust the RPM to normal operating speed with the governor adjustment.
 - Additional warm-up time may be needed during cold weather conditions.
6. Slightly open the suction block valve allowing gas to flow completely through the compressor purging the air out of the compressor through the open blowdown valve for two minutes minimum.
7. Verify the discharge block valve is open.
8. Close the blowdown valve.
9. Slowly open the suction block valve to the full open position.

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

10. Turn the control panel lock-out timer back to the zero position immediately after the discharge pressure gauge needle lifts off the low discharge pressure kill switch setting.
11. Allow the unit to reach normal load and make final RPM adjustment with the governor control. Operate the unit only with the governor and within recommended RPM and pressure ranges.
12. Check all systems for normal operation (e.g., pressures, temperatures, kill switch settings, oil levels and oil pressures, lubricator pumps, scrubber dump controls and dump operation, etc.).


4.1.3 Units with Air-to-Head or Gas-to-Head Starters

NOTE: THIS SECTION APPLIES TO UNITS THAT ARE EQUIPPED WITH AIR OR GAS-TO-HEAD STARTERS ONLY.

1. Disconnect the ignition wires from the spark plugs.
2. Check to make sure the starter piping vent valve is open. This valve is located in the starter piping between the spring loaded starting valve and the cam operated starting valve.
3. Open the petcock and compression release valve (flapper handle up) located on the engine cylinder head.
4. Spot the flywheel in the starting position (piston just past top dead center (TDC) on the power stroke). DO NOT STAND UNDER THE POSITIONING BAR WHILE ROTATING THE FLYWHEEL. Remove the bar from the flywheel after the flywheel is in starting position. DO NOT ALLOW ANYONE WITHIN 10 FEET OF THE START VALVE UNTIL THE POSITIONING BAR IS REMOVED.
5. Reset the Murphy fuel shut-off valve (if equipped with the Murphy fuel valve).
6. Reconnect the ignition wires to the spark plugs.
7. Close the petcock and compression release valve (flapper handle down).
8. Close the starter piping vent valve.
9. Reset all "tripped" tattletale buttons to their correct settings or clear the annunciator in the control panel. If there is a "quick disconnect" connection on the g-lead wire to the magneto, ensure that it is connected and immediately replace with hard wired connections.

NOTE: "QUICK DISCONNECT" CONNECTIONS ON THE G-LEAD WIRE TO THE MAGNETO SHALL NOT BE USED AND SHALL BE REPLACED WITH "HARD WIRED" CONNECTIONS IF FOUND.

10. Set (turn-on) the lock-out timer in the control panel.
11. On many units it will be required to "pump up" any lubricator pump that feeds a "no flow" switch.
12. Air Starting: Open the spring loaded air starting valve to crank the engine (250 PSIG air pressure is required). After the flywheel is rotating at cranking speed (30-50 RPM), gradually open the manual fuel valve to the half-open position until the engine fires, then close the air starting valve and adjust the manual fuel valve until the engine continues to run at idling speed (approximately 300 RPM).
13. Gas Starting: Open the manual gas starting valve to crank the engine (250 PSIG gas pressure is required). After the flywheel is rotating at cranking speed (30-50 RPM), close the manual gas starting valve and let the engine rotate two to three revolutions so air can be pulled into the cylinder through the air intake manifold, thereby allowing the engine to fire.
 - If the engine does not fire, re-open the manual gas starting valve while the engine is still rotating and repeat the procedure until the engine fires. When the engine fires (with start valve closed),


	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

gradually open, and adjust the manual fuel valve until the engine continues to run at idling speed (approximately 300 RPM).

14. If the engine fails to start, or if the flywheel stops rotating during the starting procedure, repeat Steps No. 4 through No. 17 until the unit starts.
15. With the engine running at idle speed, open the petcock on the compression relief valve and the vent valve on the starter piping. These two valves should always be left open while the unit is running to prevent wear on the lay shaft cam and cam operated starting valve.

NOTE: CHECK PANEL GAGES IMMEDIATELY. ALL SHOULD READ “ZERO” PRESSURE. IF NOT, SHUT THE UNIT DOWN IMMEDIATELY AND CHECK FOR A BLOCKAGE IN THE SYSTEM.

16. Let the engine and compressor warm-up to operating temperature at idle speed 300 RPM before putting the compressor on-line (loading).
 - Engine should be at least 140°F.
 - Compressor should be at least 80°F measured at the cross-head guide (cooler ambient temperatures may affect this temp).
 - It may be necessary to reset the control panel lock-out timer while waiting for the unit to warm-up. Make certain all pressure gages have a zero value. (See Section 4.1.2).
17. After the engine and compressor have reached operating temperature open the manual fuel valve to the full-open position and adjust the RPM to normal operating speed with the governor adjustment.
 - Additional warm-up time may be needed during cold weather conditions.
18. Slightly open the suction block valve to allow gas to flow completely through the compressor, thus purging the air through the open blowdown valve (two minute minimum time for this step).
19. Verify the discharge block valve is open.
20. Close the blowdown valve.
21. Slowly open the suction block valve to the full open position.
22. Turn the control panel lock-out timer back to the zero position immediately after the discharge pressure gauge needle lifts off the low discharge pressure kill switch setting.
23. Allow the unit to reach normal load and make final RPM adjustment with the governor control. Operate the unit only with the governor and within recommended RPM and pressure ranges.
24. Check all systems for normal operation (e.g., pressures, temperatures, kill switch settings, oil levels and oil pressures, lubricator pumps, scrubber dump controls and dump operation, etc.).


	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

4.2 Shutdown Procedure (Non-Ajax)

1. Notify all affected personnel within area you are shutting the unit down.
 2. Decrease engine speed by 25 percent.
 3. Set Class B timer or back down the low pressure kills.
 4. Open blowdown slowly until full open.
 - (Units with bypass valves) Open blowdown slowly until the discharge pressure is as low as the lowest working pressure. Open bypass valve and shut blowdown.
 5. Decrease engine speed by 50 percent.
 6. Close manual suction block valve 85 to 90 percent. (For units with bypass valves, fully close the manual suction block valve/close the valve 100 percent).
 7. Decrease engine speed to idle.
 8. Allow engine idle for 10 to 20 minutes so that it will cool down.
 9. Press the stop button to active the shutdown sequence. Equipment is shut down.
 10. Close suction valve and discharge valve
 - If using a bypass valve, open blowdown to depressurize equipment as needed).
 11. If not already in the closed position, shut/close the starter pressure supply valve to the unit.
- NOTE:** ALL EQUIPMENT THAT HAVE A SEPARATE START PRESSURE SUPPLY FROM THE FULE SUPPLY. THE MANUAL BLOCK VALVE SHOULD ALWAYS BE PLACED IN THE SHUT/CLOSED POSTION AFTER EQUIPMENT HAS BEEN STARTED AND REMAIN SHUT/CLOSED WHILE UNIT IS IN SERVICE.
12. Close the fuel gas block valve.
 13. Where blowdown is piped into manifold, open atmospheric vent valve and close manifold blowdown valve.
 14. Bleed fuel and start gas before any internal service is performed.
 15. If unit was down upon arrival, verify and complete Steps 10 through 14 of the Shutdown procedure above.

4.3 Isolation

1. Notify all affected personnel within area that you are locking the unit out
2. Follow site-specific lock out tag out procedure (LOTO) when isolating energy. Notify management if a site-specific lock out tag out is not available.

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

4.3.1 Isolation Release

NOTE: RESIDUAL ENERGY MAY INCLUDE, BUT IS NOT LIMITED TO, THE FOLLOWING:


- TRAPPED GAS PRESSURE – COMPRESSOR SIDE DISCHARGE/SUCTION VALVES,
 - OIL OR WATER SYSTEMS – ENGINE AND/OR COMPRESSOR FEEDS,
 - FUEL GAS – REGULATORS AND PIPING,
 - OTHER EQUIPMENT SYSTEMS.
1. Clear equipment from tools and materials.
 2. Ensure servicing is complete and equipment is ready to operate.
 3. Notify all affected personnel within area you are removing the energy isolation locks.
 4. Clear all non-essential personnel.
 5. Remove energy isolation (LOTO) devices.
 6. Verify all customer energy isolation (LOTO) devices are clear.

4.3.2 Pre-Start

1. Visually inspect the compressor and check the control panel to determine what caused the unit to shut down.
 - If the visual inspection of the control panel indicates a mechanical problem with the unit, do not attempt to start unit until mechanical problem is identified and repairs are completed.
2. Ensure that the suction (inlet) block valve to the compressor is closed.
3. Verify that the blowdown valve is in the open position and venting the compressor to atmosphere. Leave the blowdown valve open. Immediately check panel gauges to make certain all read “zero” to ensure no pressure is trapped in the compressor.
4. Open the manual start and fuel valve.
5. Reset the fuel shut-off valve.
6. Reset all “tripped” tattletale buttons to their correct settings or clear the annunciator in the control panel and reset engine panel if equipped. If there is a “quick disconnect” connection on the g-lead wire to the magneto, **ensure that it is connected.**

NOTE: “QUICK DISCONNECT” CONNECTIONS ON THE G-LEAD WIRE TO THE MAGNETO SHALL NOT BE USED AND SHALL BE REPLACED WITH “HARD WIRED” CONNECTIONS IF FOUND.

7. Check all fluid levels (jacket water level, engine oil level, compressor oil level, hydraulic oil level, and starter oil level, etc.).
8. Pre-lube compressor and engine if applicable-* (depending on the equipment design this can be performed with hand pumps or automatically).
 - *-Units below 300 HP may not be equipped with a pre-lube pump system.

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

NOTE: PRE-LUBE PRESSURE SHALL BE 30 PSIG (2.1 BAR) AT THE OIL GALLERY FOR A MINIMUM OF TWO MINUTES PRIOR TO STARTING. IN COLDER WEATHER ANYTHING BELOW 35 DEGREES THE MINIMUM TIME MAY NEED TO BE EXTENDED TO FIVE MINUTES TO ENSURE PROPER LUBRICATION.

NOTE: CONDUCTING A 10 TO 15 MINUTE PRE-LUBE IS MANDATORY AFTER ANY OF THE FOLLOWING ACTIVITIES:

- Any major driveline maintenance
- The main lube oil system is drained
- Oil filter replacement

9. Check to ensure throttle is set in low idle position (For units with a speed controller, check the position of the controller before unit start-up).
10. Ensure fuel and starter supply systems are purged and pressured up.
11. If there is a functioning discharge check valve, the discharge valve may be fully opened at this time instead of waiting until "LOAD Step 2."

4.3.3 Purge

NOTE: SOME APPLICATIONS IT MAY BE NECESSARY TO PERFORM THIS PURGE STEP AFTER THE UNIT IS STARTED AND IDLING; CONTACT YOUR ARCHROCK REPRESENTATIVE OR SUPERVISOR IF YOU ARE NOT SURE.

1. Notify all affected personnel you are starting to purge the unit.
2. If vent valve is not open, slowly open to full open. If blowdown is piped to a manifold system, close atmospheric blowdown and open manifold blowdown.
3. Slowly open suction valve to allow adequate gas flow to purge unit for two to five minutes.

4.4 Unit Start


Important: Always purge unit prior to starting; (see Sections 4.3.2 Pre-Start and 4.3.3 Purge).

Important: Never run a unit with both bypass and vent valve open at the same time.

Important: If a malfunction occurs at any time during the Start procedure, push the "Emergency Shutdown Button," turn "to Stop," or move "On/Off" switch to "Off" position immediately.

1. Notify all affected personnel that you are starting the unit.
2. Ensure all personnel are clear and all lock out/tag out is removed (including crew communication).
3. Verify all panel safety settings are properly set for start-up.
4. Reset panel and activate timer.
5. Turn engine control switch to "Manual/Start" position.

NOTE: IN SOME APPLICATIONS THE "AUTO" POSITION MAY BE USED INSTEAD OF "MANUAL/START" WHEN STARTING A UNIT MUST BE INITIATED BY AN OFF SKID SOURCE.

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

1. Press starter button to engage starter. If the unit does not start within 15 -20 seconds, stop pressing the starter button and disengage.
2. (Units with auto start) Press the reset button to active the pre-lube system. The unit will then start automatically.

NOTE: STARTERS ARE NOT DESIGNED TO CRANK MORE THAN 60 SECONDS AT ONE TIME.

NOTE: WARNING: DO NOT ATTEMPT ANY INTERNAL SERVICE WITHOUT FOLLOWING PROCEDURE! RECHECK THE PANEL, START/RUN TIMER, FUEL VALVE, AND FUEL SUPPLY, THEN RETRY.

4.5 Idle and Warm-Up


1. As soon as unit starts, check engine oil pressure, compressor oil pressure, process gas pressures, if applicable. Verify that there are no unusual noises.
2. If unusual noise or vibration is detected, immediately engage the Emergency Shutdown (ESD).

NOTE: DO NOT ATTEMPT ANY INTERNAL SERVICE WITHOUT FOLLOWING THE SHUTDOWN AND ISOLATION PROCEDURE.

3. Shut/close start pressure supply line, if unit is designed with the start and fuel line separate
4. If unit had to be started with no purge gas on the system, now is the time to purge unit while it is idling. Open suction valve slowly until positive pressure is achieved on the system.
5. Warm unit up until engine oil temperature reaches 130°F-135°F (54.40°C - 57.20°C) and compressor frame side door temps are at a minimum of 70°F

4.6 Start and Load (Without Bypass Valve)

1. Notify all affected personnel you are starting the unit.
2. Ensure all personnel are clear and all lock out/tag out is removed (including crew communication).
3. Ensure suction valve is in the closed position.
4. Open fuel and start gas supply.
5. Ensure blowdown valve is in the full open position.
6. Ensure discharge valve is in full open position open.
7. Verify all panel safety settings are properly set for start-up.
8. Reset fuel valve if applicable.
9. Check hand throttle or speed controller to ensure it is in the start position.
10. Reset panel and activate timer.
11. Press starter button to engage starter. If the unit does not start within 15 -20 seconds you should disengage.

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

12 (Units with auto start) Press the reset button to activate the pre-lube system (unit will start automatically).

13 Turn engine control switch to "Manual/Start" position. In some applications the "Auto" position may be used instead of "Manual/Start" when it is desired for unit starting to be initiated by an off skid source.

NOTE: STARTERS ARE NOT DESIGNED TO CRANK MORE THAN 60 SECONDS AT ONE TIME.

WARNING:

DO NOT ATTEMPT ANY INTERNAL SERVICE WITHOUT FOLLOWING PROCEDURE!

RECHECK THE PANEL, START/RUN TIMER, FUEL VALVE, AND FUEL SUPPLY, THEN RETRY.

Idle and warm-up engine (see Section 4.5).

Raise RPM to minimum loading RPM half speed or place panel in automatic.

Ensure discharge valve is in full open position open.

4.6.1 Load

1. Open manual suction valve until adequate suction pressure is reached or if equipped suction control valve takes over.

NOTE: IF THERE IS NOT A FUNCTIONING SUCTION CONTROLLER AND A FULL OPEN VALVE WOULD OVERLOAD UNIT, THEN MANUAL THROTTLING OF SUCTION VALVE WILL BE REQUIRED WHILE PROCEEDING WITH THE FOLLOWING STEPS.


2. Raise RPM to minimum loading RPM half speed or place panel in automatic.
3. Ensure the purge of the unit lasted a minimum of five minutes from idle and warm up until load.

NOTE: PURGING COULD TAKE LESS OR MORE TIME, DEPENDING ON THE SIZE OF THE EQUIPMENT OR CIRCUMSTANCES. CONSULT WITH ARCHROCK MANAGEMENT OR CUSTOMER IF PURGE TIME IS NOT CLEAR.

4. Ensure discharge block valve is in full open position.
5. Close blowdown slowly until fully closed.
6. Increase engine speed to desired RPM. Ensure had throttle is in the full open position and the speed is being maintained by the governor or speed controller.

NOTE: THE HAND THROTTLE SHOULD NEVER BE THE PRIMARY SOURCE TO CONTROL SPEED. THIS IS A MANUAL ADJUSTMENT THAT CANNOT ADJUST FOR LOAD CHANGE OR PROTECT THE ENGINE.

7. Ensure suction valve is in the full open position. If equipped with an automatic suction control valve the valve should be set to hold the suction pressure at a safe operating pressure.
8. Open side stream gas if unit is equipped.
9. Open recycle valve if equipped.

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

10. Recheck all gas pressures, discharge, suction, fuel and dump valves, ensuring they are in the full open position.

4.7 On-Line

1. As soon as the unit is loaded verify and monitor all other pressures, temperatures, noises, and engine RPM.
2. Reset all safety shutdowns to proper settings.

NOTE: IF ANY REPAIRS ARE IDENTIFIED FOLLOW SHUTDOWN PROCEDURE IN SECTION 4.2 WHEN REPAIRS ARE COMPLETED FOLLOW THE PROCEDURE THAT APPLIES:

- Start and Load (with Bypass), Idle and Warm-up, and Load
 - Start and Load (without Bypass), Idle and Warm-up, and Load
3. Perform a walk around inspection on unit verifying all systems are operational.
 4. Perform a walk around inspection on unit verifying all systems are operational.
 5. Stay with and monitor the unit for 30 minutes to one hour after unit has been placed back into service.
 6. Before leaving location perform a final check on the unit and notify all affected personnel that the unit is now in service. This may include but not limited to the answering service, customer representative, and Archrock manager.

4.8 Start and Load (With Bypass Valve)


1. Notify all affected personnel you are starting the unit.
2. Ensure all personnel are clear and all lock out/tag out is removed (including crew communication).
3. If unit was depressurized, ensure bypass and blow down are open.

NOTE: IF UNIT WAS NOT DEPRESSURIZED SKIP TO STEP 9

4. Open suction valve, purge equipment for a minimum of five minutes

NOTE: DEPENDING ON THE SIZE OF THE EQUIPMENT OR CIRCUMSTANCES, PURGING COULD TAKE LESS OR MORE TIME. CONSULT WITH ARCHROCK MANAGEMENT OR CUSTOMER IF PURGE TIME IS NOT CLEAR

5. During purge slowly close bypass valve and continue to purge for two to five minutes using blow down.
6. Ensure discharge valve is set to the full open position.
7. Close blowdown valve fully.
8. If unit is not equipped with suction control valve to protect low pressure side or maximum suction pressure is too high to start unit, close manual suction valve when adequate positive pressure is reached. This will ensure pressure does not continue to increase on the unit to prevent starting or over pressuring any systems.
9. Check to confirm positive pressure is on unit. If more pressure is needed before start-up open suction valve again raising pressure on the equipment until adequate positive pressure is reached, then close

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

suction. If less pressure is needed to stay within lowest working pressure, open blow down until acceptable pressure is reached, then close blow down.

10. Slowly open bypass valve.
11. Verify all panel safety settings are properly set for start-up.
12. Reset fuel valve, if applicable.

NOTE: FOR EQUIPMENT THAT HAVE A SEPARATE START PRESSURE SUPPLY FROM THE FULE SUPPLY, THE MANUAL BLOCK VALVE SHOULD BE PLACED IN THE OPEN POSTION PRIOR TO START.

13. Check hand throttle or speed controller to ensure it is in the start position.
14. Reset panel and activate timer.

NOTE: WHEN USING A BYPASS VALVE TO LOAD A UNIT, ALWAYS PURGE THE UNIT PRIOR TO STARTING; (SEE PRE-START AND PURGE). NEVER RUN UNIT WITH BOTH BY-PASS AND VENT VALVE OPEN AT THE SAME TIME. IN THE EVENT OF A MALFUNCTION DURING THE START PROCESS PUSH THE "EMERGENCY SHUTDOWN BUTTON (ESD), TURN "TO STOP", OR MOVE ON/OFF SWITCH TO OFF POSITION.

15. Press starter button to engage starter. If the unit does not start within 15 -20 seconds you should disengage:
 - (Units with auto start) Press the reset button to activate the pre-lube system. The unit will start automatically.
 - Turn engine control switch to "Manual/Start" position. In some applications the "Auto" position may be used instead of "Manual/Start" when it is desired for unit starting to be initiated by an off skid source.
 - When starter engages, if unit does not start within 15-20 seconds, you should disengage.

NOTE: STARTERS ARE NOT DESIGNED TO CRANK MORE THAN 60 SECONDS AT ONE TIME.

WARNING:


DO NOT ATTEMPT ANY INTERNAL SERVICE WITHOUT FOLLOWING PROCEDURE!

RECHECK THE PANEL, START/RUN TIMER, FUEL VALVE, AND FUEL SUPPLY, THEN RETRY.

16. Idle and warm-up engine (see Section 4.5).
17. Raise RPM to minimum loading RPM half speed or place panel in automatic.
18. Ensure discharge valve is in full open position open.

4.9 Load

1. Open manual suction valve until adequate suction pressure is reached or if equipped suction control valve takes over.
2. Increase engine speed.
3. Close bypass valve slowly until fully closed.
4. Ensure suction valve is fully open.

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

NOTE: IF THERE IS NOT A FUNCTIONING SUCTION CONTROLLER AND A FULL OPEN VALVE WOULD OVERLOAD UNIT. THEN MANUAL THROTTLING OF SUCTION VALVE WILL BE REQUIRED WHILE PROCEEDING WITH THE FOLLOWING STEPS.

5. Increase engine speed to desired RPM. Ensure hand throttle is in the full open position and the speed is being maintained by the governor or speed controller

NOTE: THE HAND THROTTLE SHOULD NEVER BE THE PRIMARY SOURCE TO CONTROL SPEED. THIS IS A MANUAL ADJUSTMENT THAT CANNOT ADJUST FOR LOAD CHANGE OR PROTECT THE ENGINE. RECHECK ALL GAS PRESSURES, DISCHARGE, SUCTION, FUEL AND DUMP VALVES, ENSURING THEY ARE IN THE FULL OPEN POSITION.


6. Open side stream gas if unit is equipped.
7. Open recycle valve if equipped.
8. Recheck all gas pressures, discharge, suction, fuel and dump valves, ensuring they are in the full open position.

4.10 On-Line

1. As soon as the unit is loaded verify and monitor all other pressures, temperatures, noises, and engine RPM.
2. Reset all safety shutdowns to proper settings.

NOTE: IF ANY REPAIRS ARE IDENTIFIED, FOLLOW THE APPROPRIATE SHUTDOWN PROCEDURE (SECTION 4.1 FOR AJAX, OTHERWISE SECTION 4.2). WHEN REPAIRS ARE COMPLETED, FOLLOW THE PROCEDURE THAT APPLIES.

- Start and Load (with Bypass), Idle and Warm-up, and Load
 - Start and Load (without Bypass), Idle and Warm-up, and Load
3. Perform a walk around inspection on unit verifying all systems are operational.
 4. Stay with and monitor the unit for 30 minutes-1 hour after unit is placed back into service.
 5. Before leaving location perform a final check on the unit and notify all affected personnel that the unit is now in service. This may include but not limited to the answering service, customer representative, and Archrock manager.

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

APPENDIX I: BACK MATTER AND RELATED CONTENT

A VERSION INDEX

Version	Date	Description of Changes	Revised By
0	11/4/15	Initial release.	Joe Hicks
1	4/7/17	Minor changes throughout document	Joe Hicks
2	5/15/18	Minor changes throughout document	Joe Hicks

B DEFINITIONS

Idle

For the purposes of this document, idle describes when a gas compressor engine RPM are below 300 to 500 RPM and no gas is being compressed by the compressor.

Isolation

For the purposes of this document, isolation is the act of locking out all energy sources from the equipment that work is to be performed on.

Load


For the purposes of this document, load (or loading) is the act of raising or lowering pressure and RPM on a gas compressor. Using the panel pressure and RPM gages to ensure the load is within the designed operating pressure in order to place it back into full service.

On-Line

For the purposes of this document, on-line describes when all mechanical, safety, or environmental issues for a gas compressor have been resolved, load has been properly set, all safety devices have been set, and the equipment is under its normal load.

Pre-Start

For the purposes of this document, pre-start includes inspecting equipment for safety and mechanical issues prior to starting the gas compressor.

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

Purge

For the purposes of this document, purge (or purging) may involve opening the suction gas supply to the compressor venting out the blowdown to ensure all air is out of process piping(PURGING AIR), and gas flows freely through all process piping and cylinders prior to start-up. The act of purging air should not be less than five minutes minimum. Purging will also include closing off process gas and blowing “Sweet” gas or an “Inert” gas through the process system and subsequent verification that the level of a hazardous gas is below a level where it is safe to work without breathing air. A third form of purging includes keeping a blanket of “Sweet” gas, or “Inert” gas on the pressure packing, called Packing Purge, to prevent Hazardous Gas from entering the compressor frame. Some packages have a manually operated purge for each distance piece throw.

Shutdown

For the purposes of this document, shutdown is when a gas compressor has to be taken off-line due to a safety, mechanical issue, or customer request has been identified.

Start

For the purposes of this document, start is the act removing all locks and tags, pre-lubing, making final inspection to bring a gas compressor back into service after all mechanical or safety issues have been resolved.

Warm-up

For the purposes of this document, warm-up is the act of running the engine and compressor without a load at idle RPM until the proper oil and water temperatures are reached.

C OWNERSHIP STATEMENT

The Director of Start-Up Services maintains ownership of this document and is responsible for ensuring that this document is necessary and reflects actual practice..

D REFERENCES


- Archrock Code of Business Conduct
- Basic Process and Operational Glossary (OPS-GLN-USA-001)
- Related Health, Safety, and Environmental (HSE) Documents
- Job Hazard Analysis (JHA) Form (HSE-FRM-USA-044)

NOTE: UNLESS OTHERWISE NOTED, CURRENT VERSIONS OF THE ABOVE REFERENCES MAY BE FOUND BY SEARCHING FROM THE ARCHROCK PORTAL HOME PAGE (SEE EXAMPLE, BELOW). DOCUMENTS CAN BE FOUND BY USING THE DOCUMENT TITLE, DOCUMENT NUMBER, OR BOTH VIA AN “ALL SITES” SEARCH.

All Sites

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	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

E RESPONSIBILITIES

Management

Management is responsible for implementing, supporting, and enforcing the requirements of this procedure in their locations. This includes full ownership and responsibility for ensuring work is performed in a safe and effective manner.

Management shall provide support and training on all Archrock standards related to all Stop-Start activity, identify technical training needs, and ensure the Field Service Technician receives all necessary training.

Management shall ensure that a copy of the Stop-Start procedure is made available to all Field Service Technicians and customers.

Management shall reference the Appendix section of this procedure for print-ready content suitable for use as hand-outs to Field Service Technicians, customers, or for lamination and placement in the equipment panel.

Field Service Technician (FST)

The Field Service Technician shall follow the Stop-Start procedure when operating all Archrock compressor packages.

Field Service Technicians shall follow Archrock Stop-Start procedure on customer owned compressor packages when the customers does not provide a Stop-Start procedure, ensuring that Archrock Stop-Start procedure does capture all customer requirements.

Field Service Technicians shall notify management when he or she has not been properly trained on


Archrock Stop-Start procedure or if a Stop-Start procedure is not provided by the customer.

F DOCUMENT CLASSIFICATION

Departmental Documents Web Page

The final approved version of this document shall be posted to the Archrock portal (The Rock) and is accessible via The Rock All Sites search feature.

Electronic versions of applicable checklists necessary to complete this task (if any) are located in the PerformX Mobile device. If you have trouble locating or using these documents, please contact your immediate supervisor for support or go to Solution Center on The Rock to report the issue.

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

APPENDIX II: PRINTING INSTRUCTIONS FOR STOP-START QUICK REFERENCE GUIDES

NOTE: SEE THE FOLLOWING INSTRUCTIONS ON HOW TO PRINT THE STOP-START QUICK REFERENCE GUIDES AS TWO-SIDED DOCUMENTS.


A1.1 Automatic Two-Sided (Or Duplex) Printing – Printer Instructions

NOTE: THESE INSTRUCTIONS ARE SPECIFIC TO MICROSOFT WORD 2013. IF YOU HAVE AN EARLIER VERSION OF WORD OR ARE OTHERWISE UNSURE HOW TO PROCEED, PLEASE CONTACT THE ARCHROCK BUSINESS TECHNOLOGY SERVICE DESK (1-866-380-6366) OR AN ADMINISTRATIVE ASSISTANT FOR ADDITIONAL SUPPORT.

Go to **File>Print** to access the Print Settings options, then use the following steps to print two-sided or duplex documents. Key feature locations related to these steps are shown in Figure A1-1 (below).

6. Choose “**Custom Print**” from the first drop-down box located under the Settings category (see ① in Figure A1-1, below).
7. Type the page numbers (listed below) for each Stop-Start Quick Reference guide (see ② in Figure A1-1, below).

Stop-Start Quick Reference Guide	Pages
Ajax with Air-To-Head Or Gas-To-Head Starter	18-19
Ajax with Ring-Gear Starter	20-21
Compressor WITH Bypass Line	22-23
Compressor WITHOUT Bypass Line	24-25

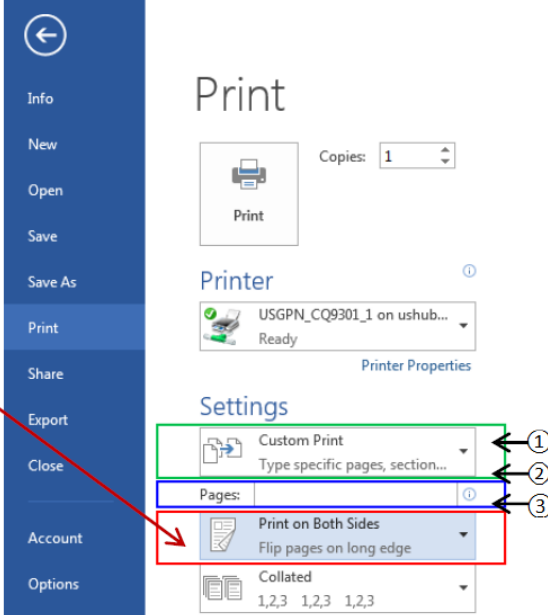
	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18


8. Select "Print on Both Sides" Flip Pages on Long Edge (see ③ in Figure A1-1, below).

Figure A1-1: Print Settings Options

If the "Print on Both Sides Flip Pages on the Long Edge" option does not appear here, then the Quick Reference guides must be printed manually.

Go to Section A1.2 (next page) for manual printing instructions.



	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

A1.2 Manual Two-Sided (Or Duplex) Printing – Printer Instructions

NOTE: THESE INSTRUCTIONS ARE SPECIFIC TO MICROSOFT WORD 2013. IF YOU HAVE AN EARLIER VERSION OF WORD OR ARE OTHERWISE UNSURE HOW TO PROCEED, PLEASE CONTACT THE ARCHROCK BUSINESS TECHNOLOGY SERVICE DESK (1-866-380-6366) OR AN ADMINISTRATIVE ASSISTANT FOR ADDITIONAL SUPPORT.


Go to **File>Print** to access the Print Settings options, then use the following steps to print two-sided or duplex documents. Key feature locations related to these steps are shown in Figure A1-1 (previous page).

1. Choose **“Custom Print”** from the first drop-down box located under the Settings category (see ① in Figure A1-1, previous page).
2. Type the page numbers for each Stop-Start Quick Reference guide (see ② in Figure A1-1, previous page).

Stop-Start Quick Reference Guide	Pages
Ajax with Air-To-Head Or Gas-To-Head Starter	18-19
Ajax with Ring-Gear Starter	20-21
Compressor WITH Bypass Line	22-23
Compressor WITHOUT Bypass Line	24-25

3. Select **“Manually Print on Both Sides** (see ③ in Figure A1-1, previous page).
4. When you print, Word will prompt you to turn the pages over and manually feed them into the printer again.

NOTE: WHEN YOU PRINT WITH THE MANUAL DUPLEX OPTION, YOU MIGHT WANT TO RUN A TEST TO DETERMINE THE CORRECT WAY TO RELOAD THE PAGES IN THE PRINTER (I.E., SO THAT BOTH SIDES PRINT THE CORRECT SIDE UP).

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

APPENDIX III: STOP START QUICK REFERENCE: AJAX WITH AIR-TO-HEAD OR GAS-TO-HEAD STARTER

NOTE: This is a Stop-Start quick reference based on normal starting and stopping practices. This reference **DOES NOT REPLACE OR SUPERCEDE SECTION 8.1 of the Start-Stop Procedure (OPS-PRC-US-NAA-019)**. Each Field Service Technician is responsible for ensuring that they have the current version of the Start-Stop Procedure available for use. Contact local management for more information.

This appendix is for Ajax compressors only. Failure to follow these guidelines could result in fire, explosions, or life threatening circumstances. In certain instances, variance from the following procedure may be required; these variances must be pre-approved by management. If you are not properly trained on the start-up and or operation of this equipment, do not attempt to operate or isolate - contact authorized Exterran personnel.

The entire Start-Stop Procedure should be reviewed BEFORE using this reference. If the design of the equipment being started does not comply with either the Start-Stop Procedure or this reference, or if you have any questions about the procedure or this reference, immediately contact Exterran management before proceeding!

SECTION 1 - Equipment Shutdown (EITHER Air-to-Head or Gas-to-Head Starting System)

1	Notify all affected personnel that equipment is being taken offline.	8	Allow engine to cool down by running under Idle for 10-20 minutes.
2	Decrease engine speed by 25 percent.	9	Press the stop button to activate shutdown sequence.
3	Set Class B timer or back down gas pressure low kills.	10	Close suction manual suction block valve.
4	Slowly open atmospheric vent or flare until fully open.	11	Close discharge manual block valve.
5	Decrease engine speed by 50 percent.	12	Close starter pressure block valve to the unit.
6	Close manual suction block valve by 85-90 percent.	13	Vent fuel system prior to starting any internal service. NOTE: For equipment that has blowdown piped into a common manifold, open atmospheric vent block valve and close the manifold blowdown block valve.
7	Decrease engine speed to Idle.		

SECTION 2 - Equipment Pre-Start (EITHER Air-to-Head or Gas-to-Head Starting System)

1	Verify that all repairs are complete.	10	Verify automatic fuel shut off valve reset.
2	Ensure all tools and trash are removed from the skid.	11	Reconnect ignition wires to spark plugs.
3	Check that the suction inlet block valve to the compressor is fully closed.	12	Close the petcock and ensure compression release valve is in Open position. Note: This valve is located on the engine cylinder head.
4	Verify that the blowdown manual block valve is in the Open position and is venting the equipment to the atmosphere.	13	Close the starter piping vent valve.
5	Confirm that all panel gauges read zero. NOTE: If all panel gauges do not read zero, immediately STOP THE JOB and find the source of trapped pressure.	14	Reset equipment panel.
6	Disconnect ignition wires from spark plugs.	15	Check all oil and water levels.
7	Starter piping vent valve is open.	16	Verify that manual reset on over speed has been checked and reset.
8	Petcock and compression release valve is in the Open position. NOTE: This valve is located on the engine cylinder head.	17	Ensure that the governor is set to Idle/Low Position. Check controller position (if equipment has speed controllers).
9	Spot flywheel is in the Start position. NOTE: Do not stand under positioning bar while rotating flywheel.	18	Open discharge manual block valve (only if equipment has a working discharge check valve).

(TURN OVER--CONTINUED ON NEXT PAGE)

Archrock TM	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

SECTION 3 - Equipment Start and Load (EITHER Air-to-Head or Gas-to-Head Starting System)

NOTE: The following 12 steps are starting system-specific (six air to head starting system only steps OR six gas to head starting system only steps). Review and complete the steps that apply to the starting system in use BEFORE you move on.


Gas to Head Starting System ONLY		Air to Head Starting System ONLY	
GS1	Open spring loaded manual gas starting valve to start turning engine over. NOTE: Use of 250 psig is required.	AS1	Open spring loaded manual gas starting valve to start turning engine over. NOTE: Use of 250 psig is required.
GS2	Rotate flywheel until engine reaches 30-50 RPM cranking speed.	AS2	Rotate flywheel until engine reaches 30-50 RPM cranking speed.
GS3	Close manual gas starting valve and allow the engine to roll two or three revolutions (to allow air into the system).	AS3	Slowly open the fuel manual block valve to half-open position until engine fires.
GS4	If the engine does not fire, repeat steps GS1 through GS3.	AS4	Close the air starting manual block valve.
GS5	Once the engine fires with the start valve closed, gradually open the manual fuel block valve until the engine reaches a 300 RPM idle run speed.	AS5	Adjust the manual fuel block valve until engine reaches a 300 RPM idle run speed.
GS6	If the engine fails to run, repeat steps GS1 through GS5.	AS6	If the engine fails to run, repeat steps AS1 through AS5.

NOTE: The 12 steps shown above are starting system-specific (six air to head starting system only steps OR six gas to head starting system only steps). Review and complete the steps that apply to the starting system in use BEFORE you move on. All remaining steps shown below apply to both starting system types.

1	(Engine running at 300 RPM idle) Open petcock on compression relief valve and vent valve on starter piping.	8	Close blowdown slowly until valve is fully closed.
2	Confirm that all panel gauges read zero. NOTE: If all panel gauges do not read zero, immediately STOP THE JOB and find the source of trapped pressure.	9	Ensure that suction inlet valve to the compressor is in the full open position. If it is not, slowly open suction inlet valve until fully open.
3	(Engine running at 300 RPM idle) Allow equipment to warm up to operating temperatures (engine=140° F, compressor=80° F, with both temperatures measured at crosshead guide).	10	Ensure the control panel lock out timer is in the zero (0) position.
4	Verify that fuel manual block valve is on the full open position.	11	Adjust governor to normal operating RPM.
5	Open manual suction block valve until adequate pressure is reached or until the equipment's automatic suction control valve takes over.	12	Open side stream gas (if equipped).
6	Discharge the manual block valve and ensure valve is in Full Open position.	13	Open recycle manual block valve (if equipped).
7	Purge equipment for a minimum of five minutes (from idle and warm until load). Note: Purge could take more than five minutes, depending on equipment size.	14	Ensure that all discharge, suction, fuel, and dump manual block valves are in the Open position.

SECTION 4 - Equipment On Line (EITHER Air-to-Head or Gas-to-Head Starting System)

1	Monitor all gas and fluid pressure, water and oil temperatures, and engine RPM. Also listen for any unusual noises.	4	Monitor equipment for 30 minutes to one hour after equipment is placed into service.
2	Reset all safety shutdowns to the proper setting.	5	Notify affected personnel equipment is back in service before leaving location.
3	Verify that all systems are operational.		

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

APPENDIX IV: STOP START QUICK REFERENCE (AJAX WITH RING GEAR STARTER)

NOTE: This is a Stop-Start quick reference based on normal starting and stopping practices. This reference **DOES NOT replace or supersede any part of the Stop-Start Procedure (OPS-PRC-USA-015a)**. Each Field Service Technician is responsible for ensuring that they have the most up to date version available. Contact local management if more information is needed.

This is for Ajax compressors only. Failure to follow these guidelines may result in fire, explosion, or life-threatening circumstances. In certain instances, variances from this ready reference may be required; these variances must be pre-approved by management. If you are not properly trained on the start-up and/or the operation of this equipment, **DO NOT ATTEMPT TO OPERATE OR ISOLATE--contact authorized Archrock personnel instead.**

The entire Stop-Start Procedure should be reviewed **BEFORE** using this reference. If the design of the equipment being started does not comply with either the Stop-Start Procedure or this reference, or if you have any questions about the procedure or this reference, immediately contact Archrock management before proceeding!

SECTION 1 - Equipment Shutdown (WITH Ring-Gear Starting System)

1	Notify all affected personnel that equipment is being taken offline.	8	Allow engine to cool down by running under idle for 10-20 minutes.
2	Decrease engine speed by 25 percent.	9	Press the stop button to activate shutdown sequence.
3	Set Class B timer or back down gas pressure low kills.	10	Close suction manual suction block valve.
4	Slowly open atmospheric vent or flare until fully open.	11	Close discharge manual block valve.
5	Decrease engine speed by 50 percent.	12	Close starter pressure block valve to the unit.
6	Close manual suction block valve by 85-90 percent.	13	Vent fuel system prior to starting any internal service. NOTE: For equipment that has blowdown piped into a common manifold, open atmospheric vent block valve and close the manifold blowdown block valve.
7	Decrease engine speed to idle.		


SECTION 2 - Equipment Pre-Start (WITH Ring-Gear Starting System)

1	Verify that all repairs are complete.	8	Open starter manual block valve.
2	Ensure all tools and trash are removed from the skid.	9	Reset equipment panel.
3	Check that the suction inlet block valve to the compressor is fully closed.	10	Check all oil and water levels.
4	Verify that the blowdown manual block valve is in the Open position and is venting the equipment to the atmosphere.	11	Verify that manual reset on over speed has been checked and reset.
5	Confirm that all panel gauges read zero (0). NOTE: If all panel gauges do not read zero, immediately STOP THE JOB and find the source of trapped pressure.	12	Ensure that the governor is set to Idle/Low Position. Check controller position (if equipment has speed controllers).
6	Open the fuel manual block valve.	13	Open discharge manual block valve (only if equipment has a working discharge check valve).
7	Verify automatic fuel shut off valve reset.		

SECTION 3 - Equipment Purge (WITH Ring-Gear Starting System)

1	All affected personnel are notified that purge is being started.	3	Open suction manual block valve purging equipment for at least five minutes.
2	Atmospheric vent/blowdown manual block valve is in the Open position and venting the equipment to atmosphere. NOTE: If equipment is piped to a manifold system, close atmospheric vent and open manifold blowdown.	4	Close suction manual suction block valve.

(TURN OVER--CONTINUED ON NEXT PAGE)

	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

APPENDIX V: STOP START QUICK REFERENCE (WITH BYPASS LINE)

NOTE: This is a Stop-Start quick reference based on normal starting and stopping practices. This reference **DOES NOT replace or supersede any part of the Stop-Start Procedure (OPS-PRC-USA-015a)**. Each Field Service Technician is responsible for ensuring that they have the most up to date version available. Contact local management if more information is needed.

The entire Stop-Start Procedure should be reviewed **BEFORE** using this reference. If the design of the equipment being started does not comply with either the Stop-Start Procedure or this reference, or if you have any questions about the procedure or this reference, immediately contact Archrock management before proceeding!

SECTION 1 - Equipment Shutdown (WITH Bypass Line)

1	Notify all affected personnel that equipment is being taken offline.	8	Allow engine to cool down by running under Idle for 10-20 minutes.
2	Decrease engine speed by 25 percent.	9	Press the stop button to activate shutdown sequence.
3	Set Class B timer or back down gas pressure low kills.	10	Close suction manual suction block valve.
4	Slowly open atmospheric or flare vent until final discharge pressure is at or below the lowest equipment working pressure. Open bypass valve and slowly close atmospheric or flare vent.	11	Close discharge manual block valve.
5	Decrease engine speed by 50 percent.	12	Open blowdown to lower pressure on unit as needed.
6	Fully close the manual suction valve.	13	Close starter pressure block valve to the unit.
7	Decrease engine speed to Idle.	14	Vent fuel system prior to starting any internal service.

SECTION 2 - Equipment Pre-Start (WITH Bypass Line)

1	Verify that all repairs are complete.	8	Open starter manual block valve.
2	Ensure all tools and trash are removed from the skid.	9	Reset equipment panel (and engine panel, if equipped).
3	Check that the suction inlet block valve to the compressor is fully closed.	10	Check all oil and water levels.
4	Verify that the blowdown manual block valve is in the Open position and is venting the equipment to the atmosphere.	11	Pre-lube equipment (if equipped with pre-lube).
5	Confirm that all panel gauges read zero. NOTE: If all panel gauges do not read zero, immediately STOP THE JOB and find the source of trapped pressure.	12	Throttle is set in Idle/Low position. Check controller position for equipment with speed controllers.
6	Open the fuel manual block valve.	13	Open the discharge manual block valve (equipment with working discharge check valve only).
7	Verify that automatic fuel shut off valve is reset.		

(TURN OVER-CONTINUED ON NEXT PAGE)

Archrock TM	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

SECTION 3 - Equipment Start and Load (WITH Bypass Line)			
1	All affected personnel are notified that equipment is being started.	14	Open manual suction block valve until adequate pressure is reached or until the equipment's automatic suction control valve takes over.
2	Equipment was depressurized, open bypass and atmospheric vent. NOTE: If equipment was NOT depressurized, skip to Step 9.	15	Discharge manual block valve is in Full Open position.
3	Open suction manual block valve, purge equipment for at least five minutes.	16	Increase engine speed to desired RPM. NOTE: If unit is equipped with hand throttle, ensure that it is in the Full Open position and that the engine speed is maintained by the governor or speed controller. Hand throttle cannot adjust for load changes.
4	Slowly close bypass manual block valve, continue purging for an additional 2-5 minutes using atmospheric vent.	17	Slowly close bypass manual block valve until fully closed.
5	Set discharge manual block valve in the Full Open position.	18	Ensure suction inlet block valve to compressor is in Full Open position. If it is not, then open slowly until valve is fully open.
6	Fully close the atmospheric vent.	19	Ensure the control panel lock out timer is in the zero (0) position.
7	Close the suction manual block valve. NOTE: This valve may be left open if a working automatic suction control valve is in place and does not allow over pressuring of the unit.	20	Increase engine speed to desired RPM. NOTE: If unit is equipped with hand throttle, ensure that it is in the Full Open position and that the engine speed is maintained by the governor or speed controller. Hand throttle cannot adjust for load changes.
8	Slowly open bypass valve.	21	Confirm that the suction control valve is holding a safe load pressure.
9	Check equipment panel for adequate pressure, adjust pressure as needed.	22	Open side stream gas (if equipped).
10	Place equipment panel in the Start position and set the start timer.	23	Open recycle manual block valve (if equipped).
11	Press starter button to engage starter. NOTE: If equipment fails to start within 15-20 seconds of pressing button, disengage starter.	24	Ensure that all discharge, suction, fuel, and dump manual block valves are in the Open position.
12	Idle and warm up equipment. NOTE: Warm up until engine reaches 130-135° F and a 70° F compressor side door temperature.	25	Close manual block valve for start gas (CAT 3500 ULB ONLY)
13	Raise engine RPM to minimum loading RPM. Half-speed or place panel in automatic.		
SECTION 4 - Equipment On Line (WITH Bypass Line)			
1	Monitor all gas and fluid pressure, water and oil temperatures, and engine RPM. Also listen for any unusual noises.	4	Ensure manual block valve for start gas is shut (CAT 3500 ULB ONLY)
2	Reset all safety shutdowns to the proper setting.	5	Monitor equipment for 30 minutes to one hour after equipment is placed into service.
3	Verify that all systems are operational.	6	Notify affected personnel equipment is back in service before leaving location.

Archrock TM	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

APPENDIX VI: STOP START QUICK REFERENCE (WITHOUT BYPASS LINE)

NOTE: This is a Stop-Start quick reference based on normal starting and stopping practices. This reference **DOES NOT replace or supersede any part of the Stop-Start Procedure (OPS-PRC-USA-015a)**. Each Field Service Technician is responsible for ensuring that they have the most up to date version available. Contact local management if more information is needed.

The entire Stop-Start Procedure should be reviewed BEFORE using this reference. If the design of the equipment being started does not comply with either the Stop-Start Procedure or this reference, or if you have any questions about the procedure or this reference, immediately contact Archrock management before proceeding!

SECTION 1 - Equipment Shutdown (WITHOUT Bypass Line)			
1	Notify all affected personnel that equipment is being taken offline.	8	Allow engine to cool down by running under Idle for 10-20 minutes.
2	Decrease engine speed by 25 percent.	9	Press the stop button to activate shutdown sequence.
3	Set Class B timer or back down gas pressure low kills.	10	Close suction manual suction block valve.
4	Slowly open atmospheric vent or flare until fully open.	11	Close discharge manual block valve.
5	Decrease engine speed by 50 percent.	12	Close starter pressure block valve to the unit.
6	Close manual suction block valve by 85-90 percent.	13	Vent fuel system prior to starting any internal service. NOTE: For equipment that has blowdown piped into a common manifold, open atmospheric vent block valve and close the manifold blowdown block valve.
7	Decrease engine speed to Idle.		
SECTION 2 - Equipment Pre-Start (WITHOUT Bypass Line)			
1	Verify that all repairs are complete.	8	Open starter manual block valve.
2	Ensure all tools and trash are removed from the skid.	9	Reset equipment panel (and engine panel, if equipped).
3	Check that the suction inlet block valve to the compressor is fully closed.	10	Check all oil and water levels.
4	Verify that the blowdown manual block valve is in the Open position and is venting the equipment to the atmosphere.	11	Pre-lube equipment (if equipped with pre-lube).
5	Confirm that all panel gauges read zero. NOTE: If all panel gauges do not read zero, immediately STOP THE JOB and find the source of trapped pressure.	12	Throttle is set in Idle/Low position. Check controller position for equipment with speed controllers.
6	Open the fuel manual block valve.	13	Open the discharge manual block valve (equipment with working discharge check valve only).
7	Verify that automatic fuel shut off valve is reset.		
SECTION 3 - Equipment Purge (WITHOUT Bypass Line)			
1	All affected personnel are notified that purge is being started.	3	Open suction manual block valve purging equipment for at least five minutes.
2	Atmospheric vent/blowdown manual block valve is in the Open position and venting the equipment to atmosphere. NOTE: If equipment is piped to a manifold system, close atmospheric vent and open manifold blowdown.	4	Close manual suction block valve.
(TURN OVER--CONTINUED ON NEXT PAGE)			

Archrock™	OPERATIONS SERVICES		
	PROCEDURE		
	STOP-START PROCEDURE		
	Version: 2	Number: OPS-PRC-USA-015A	Revised: 05/15/18

SECTION 4 - Equipment Start and Load (WITHOUT Bypass Line)			
1	All affected personnel are notified that equipment is being started.	10	Close blow down valve slowly until fully closed.
2	Place equipment panel in the Start position and set the start timer.	11	Increase engine speed to desired RPM. NOTE: If unit is equipped with hand throttle, ensure that it is in the Full Open position and that the engine speed is maintained by the governor or speed controller. Hand throttle cannot adjust for load changes.
3	Press starter button to engage starter. NOTE: If equipment fails to start within 15-20 seconds of pressing button, disengage starter.	12	Ensure suction inlet block valve to compressor is in Full Open position. If it is not, then open slowly until valve is fully open.
4	(For equipment with auto start) Press reset button to activate pre-lube system (equipment will start automatically).	13	Ensure the control panel lock out timer is in the zero (0) position.
5	Idle and warm up equipment. NOTE: Warm up until engine reaches 130-135° F and a 70° F compressor side door temperature.	14	Open side stream gas (if equipped).
6	Raise engine RPM to minimum loading RPM. Half-speed or place panel in automatic.	15	Open recycle manual block valve (if equipped).
7	Open manual suction block valve until adequate pressure is reached or until the equipment's automatic suction control valve takes over.	16	Ensure that all discharge, suction, fuel, and dump manual block valves are in the Open position.
8	Discharge manual block valve is in Full Open position.	17	Close manual block valve for start gas (CAT 3500 ULB ONLY)
9	Purge equipment for a minimum of five minutes from idle and warm up until load. NOTE: This valve may be left open if a working automatic suction control valve is in place and does not allow over pressuring of the unit.		
SECTION 5 - Equipment On Line (WITHOUT Bypass Line)			
1	Monitor all gas and fluid pressure, water and oil temperatures, and engine RPM. Also listen for any unusual noises.	4	Ensure manual block valve for start gas is shut (CAT 3500 ULB ONLY)
2	Reset all safety shutdowns to the proper setting.	5	Monitor equipment for 30 minutes to one hour after equipment is placed into service.
3	Verify that all systems are operational.	6	Notify affected personnel equipment is back in service before leaving location.